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	1676/	000200		000100
	1700/	177776		177564
	1702/	012767		042737
	1704/	000100		000200
	1706/	175654	177776	

IDENTIFICATION

PRODUCT CODE:	MAINDEC-11-DFKTD-A-D
PRODUCT NAME:	11/34 MEMORY MANAGEMENT PROCESSOR STATES TEST
DATE CREATED:	DECEMBER 21, 1975
MAINTAINER:	DIAGNOSTIC GROUP
AUTHOR:	GLENN JOHNSON

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MAY BE REQUIRED FOR
PROGRAM TO OPERATE

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50 1.0 ABSTRACT
51 -----
52
53 THIS IS A TEST THAT UTILIZES THE 11/34 MEMORY MANAGEMENT
54 FEATURES AND TESTS THAT IN THE TWO PDP11/34 STATES
55 (KERNEL, USER) INSTRUCTIONS ARE EXECUTED PROPERLY. THIS
56 TEST TESTS TRAPS FROM ONE STATE TO THE OTHER AND USES
57 THE MFPI/MTPI INSTRUCTIONS.
58
59 2.0 REQUIREMENTS
60 -----
61
62 2.1 EQUIPMENT
63
64 PDP-11/34
65
66 2.2 STORAGE
67
68 UTILIZES 4K OF MEMORY.
69
70 3.0 LOADING PROCEDURE
71 -----
72
73 LOAD PROGRAM INTO MEMORY USING ABSOLUTE LOADER.
74
75 4.0 STARTING PROCEDURE
76 -----
77
78 LOAD ADDRESS 200. PRESS START, THE PROGRAM WILL LOOP
79 AND RING BELL ON COMPLETION OF A PASS.
80
81 5.0 OPERATION PROCEDURE
82 -----
83
84 5.1 OPERATIONAL SWITCH SETTINGS
85
86 NONE
87
88 5.2 SUBROUTINE ABSTRACTS
89
90 5.2.1 SCOPE
91
92 SCOPE IS A MOV PC,R1 AND STORE THE PC+2 IN R1 THUS R1
93 MAY BE USED AS A REFERENCE TO DETERMINE THE LAST TEST
94 SUCCESSFULLY COMPLETED.
95
96 5.2.2 HLT
97
98 HLT IS A HALT INSTRUCTION AND IS EXECUTED WHENEVER A
99 HARDWARE MALFUNCTION IS DETECTED.
100
101 5.3 PROGRAM AND/OR OPERATOR ACTION
102

103 5.3.1 PASS COUNT (ICNT)
104
105 THE NUMBER OF PROGRAM PASSES COMPLETED IS CONTAINED IN
106 ADDRESS ICNT (LOC. 1000). THIS ADDRESS MAY BE EXAMINED
107 TO DETERMINE IN WHICH PASS THE ERROR OCCURRED.
108
109 6.0 ERRORS
110 -----
111
112 6.1 TEST ERROR WILL CAUSE A HALT
113
114 FALSE TRAP/INTERRUPT ERRORS - THE PROGRAM WILL HALT AT
115 THE TRAP VECTOR ADDRESS +2. THE CONTENTS OF R6 CONTAINS
116 THE ADDRESS WHERE THE PC OF THE INSTRUCTION THAT CAUSED
117 THE TRAP IS STORED.
118
119 6.2 ERROR RECOVERY
120
121 TEST ERRORS - PRESS CONTINUE OR LOOP TEST (SEE 6.3)
122 TRAP ERRORS - DETERMINE WHERE ERROR OCCURRED (SEE 6.1)
123
124 6.3 ERROR LOOPING
125
126 TO LOOP ON AN ERROR REPLACE THE HLT INSTRUCTION WITH A
127 BRANCH BACK TO THE PREVIOUS SCOPE INSTRUCTION. NOTE THAT
128 IF THE ERROR IS INTERMITTENT THE TEST WILL DROP THRU THE
129 HLT AND PROCEED TO THE NEXT TEST. THEREFORE, TO LOOP THE
130 TEST CONTINUOUSLY, REPLACE THE BEQ .+4 INSTRUCTION PRE-
131 CEEDING THE HLT WITH THE BRANCH BACK TO THE PREVIOUS SCOPE.
132
133 7.0 RESTRICTIONS
134 -----
135
136 THIS PROGRAM MUST BE LOADED IN LOWER 4K.
137
138 7.1 STARTING RESTRICTION
139
140 ALL PROGRAMS MUST BE INITIALLY STARTED AT 200 AND MAY BE
141 STARTED AT A SCOPE INSTRUCTION THEREAFTER.
142
143 7.2 OPERATIONAL RESTRICTIONS
144
145 NONE
146
147 8.1 EXECUTION TIME
148 -----
149
150 ONE PASS TAKES APPROXIMATELY 10 SECONDS.
151
152
153 *
154
155 .TITLE TEST DFKTDA PDP11/34 PROCESSER STATES TEST
156 .ABS

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157 ;THIS TEST IS A MODIFICATION TO THE PDP-11/40 TEST, DBKTD.
158 ;THIS TEST HAS BEEN MODIFIED TO ACCOUNT FOR ANY 11/40 - 11/34
159 ;DIFFERENCES. THIS PROGRAM IS INTENDED TO BE RUN ON ONLY THE
160 ;11/34.
161
162 ;TEST DFKTDA TESTS FEATURES OF THE TWO PROCESSER STATES AND INCLUDES
163 ;TRAPS FROM ALL STATES TO ALL OTHER STATES, AND MFP/MTP INSTRUCTIONS IN ALL
164 ;STATES AND PREVIOUS STATES.
165 ;NOTE: ALL TESTS ARE ENTERED AND EXITED IN KERNEL MODE.
166
167 ;STARTING PROCEEDURE
168 / LOAD ADDRESS=200
169 / START
170 / KERNEL STACK POINTER IS AT 500
171 / USER STACK POINTER IS AT 700
172 / BELL WILL RING WHEN TEST IS COMPLETE
173
174 ;REGISTER ASSIGNMENTS
175 R0=X0
176 R1=X1
177 R2=X2
178 R3=X3
179 R4=X4
180 R5=X5
181 PC=X7
182
183 ;STACK POINTERS
184 KSP=X6 ;KERNEL STACK POINTER
185 USP=X6 ;USER STACK POINTER
186 HLT=HALT
187 SCOPE=010701 ;MOVE PC TO R1
188 TRY=3 ;TRACE TRAP
189 PRTY3=140
190 PRTY4=200
191 PRTY7=340
192
193 ;VECTOR ADDRESSES
194 ERVVEC=4 ;ADDRESS OF ERROR VECTOR
195 RESVEC=10 ;ADDRESS OF RESERVED INST TRAP VECTOR
196 EMTVEC=30 ;ADDRESS OF EMT VECTOR
197 TRAPVEC=34 ;ADDRESS OF TRAP VECTOR
198 IOTVEC=20 ;ADDRESS OF IOT VECTOR
199 TBTVEC=14 ;ADDRESS OF 'T' BIT TRAP VECTOR
200 TRTVEC=14 ;ADDRESS OF 'TRACE' TRAP
201 TPVEC=64 ;ADDRESS OF TTY PRINTER INTERRUPT VECTOR
202
203 ;HARDWARE REGISTER ASSIGNMENTS
204 PSW=17776 ;ADDRESS OF STATUS REGISTER
205 TKR=177560 ;ADDRESS OF KEYBOARD CSR
206 TKB=177562 ;ADDRESS OF KEYBOARD BUFFER
207 TPS=177564 ;ADDRESS OF TELEPRINTER CSR
208 TPB=177566 ;ADDRESS OF TELEPRINTER BUFFER
209 SWR=177570 ;ADDRESS OF CONSOL SWITCH REGISTER
210
211 ;INITIAL STACK POINTER SETTINGS
212 KPTR=500 ;KERNEL INITIAL STACK POINTER VALUE

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211 000700 UPTR=700 ;USER INITIAL STACK POINTER VALUE
212 001000 YELPTR=1000 ;STACK POINTER VALUE FOR 'YELLOW' OVFLW
213 000736 REDPTR=736 ;STACK POINTER VALUE FOR 'RED' OVFLW
214
215 ;MISC. BIT ASSIGNMENTS
216 100000 BIT15=100000
217 040000 BIT14=400000
218 020000 BIT13=200000
219 000100 BIT6=100
220
221 ;STATUS REGISTER BIT ASSIGNMENTS
222 UM=140000 ;USER MODE
223 100000 IM=100000 ;ILLEGAL MODE
224 040000 IM1=400000 ;ILLEGAL MODE
225 000000 KM=0 ;KERNEL MODE
226 030000 PUM=030000 ;PREVIOUS USER MODE
227 000000 PKM=0 ;PREVIOUS KERNEL MODE
228 000000 REG=0 ;REGISTER BIT: HAS NO EFFECT!!!!
229 000020 TBIT=20 ;'T' BIT IN #PSW
230 000001 C=1 ;'C' BIT IN PS
231 000002 V=2 ;'V' BIT IN PS
232 000004 Z=4 ;'Z' BIT IN PS
233 000010 N=10 ;'N' BIT IN PS
234
235
236
237 000000 .#0
238 .#REPT 100
239 .#2
240 HALT
241 .#ENDR
242
243 000046 .#46
244 000046 006144 LOGIC
245 000052 .#52
246 000052 0
247
248 .#200
249 000200 000167 000606 JMP START ;GO START
250
251 .#1000
252 ;TAGS
253
254 001000 000000 ICNT: 0 ;CONTAINS PASS COUNT
255 001002 000000 TEMP: 0
256 001012 .#.#6

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257
258 001012 012706 000500          START: MOV    #KPTR,KSP
259 001016 005067 177756          CLR    ICNT
260                                ;TEST THAT PROCESSOR POWERED UP OK FOR THE TEST
261 001022 032737 000000 177776  PHRUP: BIT    #KM+PKM,#PPSW  ;IS STATUS CORRECT
262 001030 001377                    BNE    .           ;LOOP HERE IF NOT
263
264 001032 012706 000500          BEGIN: MOV    #KPTR,KSP  ;INITIALIZE THE STACK POINTER
265
266                                ;CHECK THAT THE NOP INSTRUCTION IS A 'NOP' IN USER MODE.
267 001036 010701          T1:  SCOPE
268 001040 012737 140000 177776    MOV    #UM,#PPSW  ;USER MODE,PRIORITY LEVEL 0
269 001044 000240          NOP
270 001050 013700 177776          MOV    #PPSW,R0    ;GET #PPSW
271 001054 005037 177776          CLR    #PPSW       ;KERNEL MODE!!!
272 001060 022700 140000          CMP    #UM,R0      ;TEST THAT NOP DID NOT ALTER #PPSW
273 001064 001401          BEQ    ,+4
274 001066 000000          HLT                    ;ERROR! NOP CHANGED STATUS WORD
275
276
277                                ;TEST TRAP FROM USER MODE TO KERNEL MODE
278 001070 010701          T5:  SCOPE
279 001072 012706 000500          MOV    #KPTR,KSP
280 001076 012737 001134 000020    MOV    #T5A,#IOTVEC
281 001104 005067 176712          CLR    IOTVEC+2
282 001110 012737 140340 177776    MOV    #UM+PRIV7,#PPSW ;USER MODE!!!
283 001116 012706 000700          MOV    #UPTR,USP
284 001122 000277          SCC
285 001124 000004          IOT
286 001126 005037 177776          T5AA: CLR    #PPSW
287 001132 000000          HLT
288 001134 013700 177776          T5A:  MOV    #PPSW,R0
289 001140 005037 177776          CLR    #PPSW
290 001144 022700 030000          CMP    #KN+PUM,R0
291 001150 001401          BEQ    ,+4
292 001152 000000          HLT
293 001154 022767 001126 177312    CMP    #T5AA,KPTR-4
294 001162 001401          BEQ    ,+4
295 001164 000000          HLT
296 001166 022767 140357 177302    CMP    #UM+PRIV7+17,KPTR-2
297 001174 001401          BEQ    ,+4
298 001176 000000          HLT
299 001200 022706 000474          CMP    #KPTR-4,KSP
300 001204 001401          BEQ    ,+4
301 001206 000000          HLT
302 001210 012737 140000 177776    MOV    #UM,#PPSW
303 001216 010600          MOV    USP,R0
304 001220 005037 177776          CLR    #PPSW
305 001224 022700 000700          CMP    #UPTR,R0
306 001230 001401          BEQ    ,+4
307 001232 000000          HLT
308 001234 012737 000022 000020    MOV    #IOTVEC+2,#IOTVEC
309
310                                ;TEST TRAP FROM USER TO USER MODE (VIA TRACE TRAP)
    
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311 001242 010701          T7:  SCOPE
312 001244 012767 001302 176542    MOV    #T7A,TRTVEC
313 001252 012767 140000 176536    MOV    #UM,TRTVEC+2  ;USER MODE ON TRAP
314 001260 012737 140000 177776    MOV    #UM,#PPSW
315 001266 012706 000700          MOV    #UPTR,USP
316 001272 000003          TRT
317 001274 005037 177776          T7AA: CLR    #PPSW
318 001300 000000          HLT
319 001302 013700 177776          T7A:  MOV    #PPSW,R0
320 001306 010602          MOV    USP,R2
321 001310 042737 140000 177776    BIC    #UM,#PPSW
322 001316 022767 001274 177350    CMP    #T7AA,UPTR-4
323 001324 001401          BEQ    ,+4
324 001326 000000          HLT
325 001330 022700 170000          CMP    #UM+PUM,R0
326 001334 001401          BEQ    ,+4
327 001336 000000          HLT
328 001340 012767 000016 176446    MOV    #TRTVEC+2,TRTVEC
329 001346 005067 176444          CLR    TRTVEC+2
330
331                                ;TEST THAT THE 'HALT' INSTRUCTION TRAPS TO LOCATION 10 IN
332                                ;USER MODE.
333 001352 010701          T12: SCOPE
334 001354 012737 001410 000010    MOV    #T12A,#RESVEC
335 001362 005037 000012          CLR    #RESVEC+2
336 001366 012706 000500          MOV    #KPTR,KSP
337 001372 012737 140000 177776    MOV    #UM,#PPSW  ;USER MODE!!!
338 001400 000000          HALT                ;HALT TRAPS IN USER MODE
339 001402 005037 177776          T12AA: CLR    #PPSW
340 001406 000000          HALT                ;ERROR! HALT DID NOT TRAP
341 001410 013700 177776          T12A: MOV    #PPSW,R0
342 001414 005037 177776          CLR    #PPSW
343 001420 022700 030000          CMP    #KN+PUM,R0
344 001424 001401          BEQ    ,+4
345 001426 000000          HLT
346 001430 022767 001402 177036    CMP    #T12AA,KPTR-4
347 001436 001401          BEQ    ,+4
348 001440 000000          HLT
349
350                                ;CHECK THAT SPL TRAPS TO 10 IN USER MODE.
351 001442 010701          T13: SCOPE
352 001444 012737 001474 000010    MOV    #T13A,#RESVEC
353 001452 012706 000500          MOV    #KPTR,KSP  ;SET KERNEL STACK PTR
354 001456 012737 140000 177776    MOV    #UM,#PPSW  ;USER MODE!!!
355 001464 000237          SPL    7           ;SPL TRAPS IN USER MODE
356 001466 005037 177776          T13AA: CLR    #PPSW
357 001472 000000          HALT                ;KERNEL MODE!!!
358 001474 013700 177776          T13A: MOV    #PPSW,R0
359 001500 005037 177776          CLR    #PPSW
360 001504 022700 030000          CMP    #KN+PUM,R0
361 001510 001401          BEQ    ,+4
362 001512 000000          HLT
363 001514 022767 001466 176752    CMP    #T13AA,KPTR-4
364 001522 001401          BEQ    ,+4
    
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365 001524 000000          HLT
366 001526 012737 000012 000010      MOV      #RESVEC+2,##RESVEC
367
368
369 001534 010701          ;TEST THAT "RESET" RESETS IN KERNEL MODE
370 001536 005037 177776      T18:    SCOPE
371 001542 012737 000340 177776      CLR      ##PSW
372 001550 012767 000100 176006      MOV      #PRTY7,##PSW ;PRIORITY TO 7
373 001556 000005          MOV      #100,177564 ;SET "IE" IN TPS
374 001560 005037 177776      RESET   ;CLEAR "IE"
375 001564 032767 000100 175772      CLR      ##PSW
376 001572 001401          BIT      #100,177564
377 001574 000000          BEQ     .+4
378
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380
381 001576 010701          ;TEST THAT "RESET" NOP'S IN USER MODE
382 001600 012737 140340 177776      T19:    SCOPE
383 001606 012767 000100 175750      MOV      #UM+PRTY7,##PSW ;USER MODE!!!
384 001614 000005          MOV      #100,177564 ;SET "IE"
385 001616 032767 000100 175740      RESET   ;SHOULD NOP
386 001624 001001          BIT      #100,177564
387 001626 000000          BNE     .+4
388 001630 005067 175730      HLT     ;"IE" CLEARED
389 001634 005037 177776      CLR     177564
390
391
392 001640 010701          ;TEST INTERRUPT SEQUENCE USER TO KERNEL MODE
393 001642 012706 000500          T15:    SCOPE
394 001646 012737 170340 177776      MOV      #KPTR,KSP ;SET KERNEL STACK POINTER
395 001654 012767 001720 176202      MOV      #UM+PUM+PRTY7,##PSW ;USER MODE!!!
396 001662 012767 000200 176176      MOV      #T15A,64 ;INTERRUPT VEC.
397 001670 012706 000700          MOV      #KM+PRTY4,66
398 001674 042737 000200 177776      MOV      #UPTR,USP ;SET USER STACK POINTER
399 001702 012767 000100 175654      BIC      #PRTY4,##PSW ;SET PRIORITY LEVEL=3
400 001710 000240          MOV      #100,177564 ;REQUEST AN INTERRUPT AT LEVEL 4
401 001712 005037 177776      T15AA:  NOP
402 001716 000000          CLR     ##PSW ;KERNEL MODE!!!
403 001720 013700 177776          HLT     ;ERROR! NO INTERRUPT REQUEST
404 001724 005067 175634          T15A:  MOV      ##PSW,R0 ;GET "NEW" ##PSW
405 001730 005037 177776          CLR     177564 ;DISABLE REQUEST
406 001734 022700 030200          CLR     ##PSW
407 001740 001401          CMP     #KM+PUM+PRTY4,R0 ;TEST THAT "NEW" ##PSW IS CORRECT
408 001742 000000          B.G    .+4 ;(PIRVEC+2)
409 001744 022767 001710 176522      HLT     ;ERROR! "NEW" ##PSW NOT = TO (PIRVEC+2)
410 001752 001401          CMP     #T15AA,KPTR-4 ;IS RETURN ADDRESS ON KERNEL STACK
411 001754 000000          BEQ     .+4
412 001756 022767 170140 176512      HLT     ;ERROR! RETURN ADDRESS NOT ON KERNEL STACK
413 001764 001401          CMP     #UM+PUM+PRTY3,KPTR-2 ;TEST THAT "OLD" ##PSW WAS SAVED ON
414 001766 000000          BEQ     .+4 ;KERNEL STACK
415 001770 012767 000066 176066      HLT     ;ERROR!
416 001776 005067 176064          MOV     #66,64
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419 002002 010701          T17:    SCOPE
420 002004 012737 140000 177776      MOV      #UM,##PSW ;USER MODE!!!
421 002012 012737 002234 000004      MOV      #T17ERR,##ERRVEC
422 002020 012706 000700          MOV      #UPTR,USP ;SET USER STACK POINTER
423 002024 005067 176752          CLR     TEMP ;CLEAR INDICATOR LOCATION
424 002030 004767 000006          T17A:  JSR     7,T17B ;PUSH ONTO USER STACK
425 002034 052767 000400 176740      BIS     #400,TEMP ;SET ERROR INDICATOR BIT
426 002042 052767 000001 176732      T17B:  BIS     #1,TEMP ;SET INDICATOR BIT
427 002050 004567 000006          JSR     5,T17C ;PUSH ONTO USER STACK
428 002054 052767 001000 176720      BIS     #1000,TEMP ;SET ERROR INDICATOR BIT
429 002062 052767 000002 176712      T17C:  BIS     #2,TEMP ;SET INDICATOR BIT
430 002070 005046          BIS     R5,-(USP) ;PUSH ONTO USER STACK
431 002072 052767 000004 176702      BIS     #4,TEMP ;SET INDICATOR BIT
432 002100 004767 000006          JSR     7,T17D ;PUSH ONTO USER STACK
433 002104 052767 002000 176670      BIS     #2000,TEMP ;SET ERROR INDICATOR BIT
434 002112 052767 000010 176662      T17D:  BIS     #10,TEMP
435 002120 012702 002134          MOV     #T17E,R2 ;SET UP RETURN FOR RTS
436 002124 000202          RTS     R2 ;GO TO T16E
437 002126 052767 004000 176646      BIS     #4000,TEMP ;SET INDICATOR TO SHOW ERROR
438 002134 052767 000020 176640      T17E:  BIS     #20,TEMP
439 002142 004567 000006          JSR     R5,T17F
440 002146 052767 010000 176626      BIS     #10000,TEMP ;SET ERROR INDICATOR BIT
441 002154 052767 000040 176620      T17F:  BIS     #40,TEMP
442 002162 012737 002206 000034      MOV     #T17G,##TRAPVEC ;SET UP TRAP VECTOR FOR TRAP
443 002170 012737 140000 000036      MOV     #UM,##TRAPVEC+2
444 002176 104400          TRAP
445 002200 052767 020000 176574      BIS     #20000,TEMP
446 002206 052767 000100 176566      T17G:  BIS     #100,TEMP
447 002214 005037 177776          CLR     ##PSW ;KERNEL MODE!!!
448 002220 022767 000177 176554      CMP     #177,TEMP
449 002226 001401          BEQ     .+4
450 002230 000000          HLT
451 002232 000403          BR     T17X
452 002234 005037 177776          T17ERR: CLR ##PSW
453 002240 000000          HLT     ;ERROR! OVERFLOW OCCURED
454 002242 000240          T17X:  NOP
455 002244 012737 000R36 000034      MOV     #TRAPVEC+2,##TRAPVEC
456 002252 005067 175500          CLR     TRAPVEC+2
457
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460
461 002256 010701          ;TEST THAT MTPD/I POPS WORD OFF THE THE APPROPRIATE STACK (AS
462 002260 005037 177776          ;DETERMINED BY BITS 15&14 IN ##PSW.)
463 002264 012706 000500          ;MTPD, KERNEL MODE
464 002270 012700 177777          T21:    SCOPE
465 002274 005016          CLR     ##PSW
466 002276 012737 030011 177776      MOV     #KPTR,KSP ;SET KERNEL STACK POINTER
467 002304 006600          MOV     #-1,R0 ;PRE-SET R0
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473 002322 022706 000502      CMP      #KPTR+2,KSP      J0ID KSP INCREMENT BY 2
474 002326 001401              BEQ      .+4
475 002330 000000              HLT
476 002332 005700              TST      R0              JERROR! KSP DID NOT POP
477 002334 001401              BEQ      .+4              J0ID WORD ON STACK (0) GET TO P?
478 002336 000000              HLT                          JERROR! MTPD DID NOT POP 0 OFF
479                                          JKSP INTO R0
480
481
482 002340 010701              JMTPI,KERNEL MODE
483 002342 005037 177776      T22:    SCOPE
484 002346 012706 000500      CLR      #0PSW
485 002352 005002              MOV      #KPTR,KSP
486 002354 012716 177777      MOV      R2
487 002360 012737 030006 177776      CLR      #-1,(KSP)
488 002366 006602              MOV      #PUM+Z+V,#0PSW
489                                          JPRESET R2
490 002370 013700 177776      MTP1    R2
491 002374 022700 030010      MOV      #0PSW,R0
492 002400 001401              CMP      #PUM+N,R0
493 002402 000000              BEQ      .+4
494 002404 022706 000502      HLT
495 002410 001401              CMP      #KPTR+2,KSP
496 002412 000000              BEQ      .+4
497 002414 005202              HLT
498 002416 001401              INC      R2
499 002420 000000              BEQ      .+4
500                                          JERROR!
501
502 002422 010701              JMTPD, USER MODE
503 002424 012737 140000 177776      T25:    SCOPE
504 002432 012706 000700      MOV      #UM,#0PSW
505 002436 052716 177777      MOV      #UPTR,USP
506 002442 000261              BIS      #-1,(USP)
507 002444 042705 177777      SEC
508 002450 006605              BIC      #-1,R5
509                                          MTP1    R5
510                                          JRS_(USP)+
511 002452 013700 177776      MOV      #0PSW,R0
512 002456 010602              MOV      USP,R2
513 002460 005037 177776      CLR      #0PSW
514 002464 022700 140011      CMP      #UM+N+C,R0
515 002470 001401              BEQ      .+4
516 002472 000000              HLT
517 002474 022702 000702      CMP      #UPTR+2,R2
518 002500 001401              BEQ      .+4
519 002502 000000              HLT
520 002504 005205              INC      R5
521 002506 001401              BEQ      .+4
522 002510 000000              HLT
523
524
525 002512 010701              JMTPI, USER MODE
526 002514 012737 140000 177776      T26:    SCOPE
527                                          MOV      #UM,#0PSW

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527 002522 012706 000700      MOV      #UPTR,USP
528 002526 042716 177777      BIC      #-1,(USP)
529 002532 052700 177777      BIS      #-1,R0
530 002536 000257              CCC
531 002540 006600              MTP1    R0
532                                          JRO_(USP)+
533 002542 013702 177776      MOV      #0PSW,R2
534 002546 010603              MOV      USP,R3
535
536 002550 005037 177776      CLR      #0PSW
537 002554 022702 140004      CMP      #UM+Z,R2
538 002560 001401              BEQ      .+4
539 002562 000000              HLT
540 002564 022703 000702      CMP      #UPTR+2,R3
541 002570 001401              BEQ      .+4
542 002572 000000              HLT
543 002574 005700              TST      R0
544 002576 001401              BEQ      .+4
545 002600 000000              HLT
546
547
548
549
550 002602 010701              JTEST THAT MTP D/I POPS WORD OFF STACK (AS DETERMINED BY BITS 15 & 14
551 002604 012737 140000 177776      INTO STACK POINTER (AS DETERMINED BY BITS 13 & 12).
552 002612 005006              JUSP_(KSP)+,MTPD
553 002614 012737 030000 177776      T30:    SCOPE
554 002622 012706 000500      MOV      #UM,#0PSW
555 002626 012716 000700      CLR      USP
556 002632 000277              MOV      #KH+PUM,#0PSW
557 002634 006606              MOV      #KPTR,KSP
558                                          JSET KERNEL STACK POINTER
559 002636 013702 177776      MOV      #UPTR,(KSP)
560 002642 012737 140000 177776      JPRESET CC'S
561 002650 010600              MTP1    USP
562 002652 005037 177776      JUSP_(KSP)+
563 002656 022700 000700      MOV      #0PSW,R2
564 002662 001401              JSAVE CC'S
565 002664 000000              MOV      #UM,#0PSW
566 002666 022706 000502      JUSER MODE!!!
567 002672 001401              JPRESET USER STACK POINTER
568 002674 000000              MOV      USP,R0
569                                          JGET USER STACK POINTER
570
571
572 002676 010701              JMTPI,KERNEL MODE
573 002700 012706 000500      T31:    SCOPE
574 002704 012716 000736      CLR      #0PSW
575 002710 006606              MOV      #KPTR,KSP
576 002712 022706 000736      MTP1    #REDPTR,(KSP)
577 002716 001401              CMP      KSP
578 002720 000000              BEQ      .+4
579                                          JKSP_(KSP)+
580                                          HLT
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581 002722 010701          T31C1 SCOPE
582 002724 012737 170000 177776 MOV #UM+PUM,##PSW ;USER MODE!!!, PREV USER MODE!!
583 002732 012706 000700 MOV #UPTR,USP ;SET USER STACK PTR
584 002736 005016 CLR (USP) ;PUT #0 ON USER STACK
585 002740 000257 CCC
586 002742 006606 MTPI USP ;USP_(USP)+
587
588 002744 013700 177776 MOV ##PSW,R0 ;SAVE CC'S
589 002750 010602 MOV USP,R2 ;SAVE USER STACK POINTER
590 002752 005037 177776 CLR ##PSW ;KERNEL MODE!!!
591 002756 022700 170004 CMP #UM+PUM+2,R0 ;CHECK STATUS
592 002762 001401 BEQ ,+4
593 002764 000000 HLT ;ERROR! INCORRECT STATUS AFTER MTPD
594 002766 005702 TST R2 ;CHECK NEW STACK POINTER VALUE
595 002770 001401 BEQ ,+4
596 002772 000000 HLT ;ERROR! MTPD FAILED TO SET USER STACK POINTER
597
598
599 002774 010701          ;USP_(KSP)+,MTPI
600 002776 012737 140000 177776 T32A1 SCOPE
601 003004 012706 177777 MOV #UM,##PSW ;USER MODE
602 003010 012737 030000 177776 MOV #1,USP ;PRESET USER STACK POINTER
603 003016 005046 CLR #KM+PUM,##PSW ;CURRENT KERNEL,PREVIOUS USER
604 003020 006606 MTPI USP ;USP_(KSP+
605
606 003022 012737 140000 177776 MOV #UM,##PSW
607 003030 010602 MOV USP,R0 ;GET USER STACK POINTER
608 003032 005037 177776 CLR ##PSW
609 003036 005700 TST R0
610 003040 001401 BEQ ,+4
611 003042 000000 HLT
612
613
614 003044 010701          ;USP_(USP)+
615 003046 012737 170000 177776 T35: SCOPE
616 003054 012706 000700 MOV #UM+PUM,##PSW
617 003060 012716 000700 MOV #UPTR,(USP)
618 003064 006606 MTPI USP ;USP_(USP)+
619
620 003066 010600 MOV USP,R0
621 003070 005037 177776 CLR ##PSW
622 003074 022700 000700 CMP #UPTR,R0
623 003100 001401 BEQ ,+4
624 003102 000000 HLT
625
626
627
628 ;TEST THAT MTPD/I TRAPS ON AN ODD ADDRESS DESTINATION
629 ;KERNEL MODE
630 003104 010701          T36: SCOPE
631 003106 005037 177776 CLR ##PSW
632 003112 012706 000500 MOV #KPTR,KSP
633 003116 012716 177777 MOV #-1,(KSP)
634 003122 012737 003142 000004 MOV #T36A,##ERRVEC
635 003130 005067 174652 CLR ERRVEC+2

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635 003134 006667 174637          MTPI -1 ;TRAPS ON ODD ADDRESS
636 003140 000000          HLT ;ERROR! DID NOT TRAP
637 003142 022706 000476 T36A: CMP #KPTR-2,KSP ;IS KSP CORRECT?(1 POP AND 2
638 003146 001401          BEQ ,+4 ;PUSHES)
639 003150 000000          HLT ;ERROR! INCORRECT VALUE IN KSP
640 003152 022767 003140 175316 CMP #T36AA,KPTR-2
641 003160 001401          BEQ ,+4
642 003162 000000          HLT
643
644
645 003164 010701          ;USER MODE
646 003166 012737 170000 177776 T40: SCOPE
647 003174 012702 000001 MOV #1,R2 ;USER MODE!!!, PREV USER MODE!!
648 003200 012706 000700 MOV #UPTR,USP ;SET USER STACK POINTER
649 003204 012716 125252 MOV #125252,(USP) ;PRESET USER STACK
650 003210 012737 003234 000004 MOV #T40A,##ERRVEC ;LOAD ERROR VECTOR
651 003216 012737 140000 000006 MOV #UM,##ERRVEC+2
652 003224 006642          MTPI -(R2) ;-(R2)_(USP)+;SHOULD TRAP ON ODD ADRS
653 003226 005037 177776 T40AA: CLR ##PSW ;KERNEL MODE!!!
654 003232 000000          HLT ;ERROR! DID NOT TRAP
655 003234 010600 T40A: MOV USP,R0 ;GET USER STACK POINTER
656 003236 042737 140000 177776 BIT #UM,##PSW ;KERNEL MODE!!!
657 003244 022700 000676 CMP #UPTR-2,R0 ;CHECK THAT USER STACK POINTER
658 003250 001401          BEQ ,+4 ;PUSHED PROPERLY (1 POP,2 PUSHES)
659 003252 000000          HLT ;ERROR! INCORRECT USER STACK POINTER
660 003254 022737 170010 000700 CMP #UM+PUM+N,##UPTR ;CHECK THAT CORRECT STATUS WAS
661 003262 001401          BEQ ,+4 ;SAVED ON USER STACK (*N* IS DATA POPPED)
662 003264 000000          HLT ;ERROR! INCORRECT STATUS SAVED ON USER STACK
663 003266 022767 003226 175402 CMP #T40AA,UPTR-2 ;CHECK THAT RETURN ADDRESS WAS
664 003274 001401          BEQ ,+4 ;SAVED ON USER STACK
665 003276 000000          HLT ;ERROR! RETURN PC NOT ON USER STACK
666 003300 022702 177777 CMP #-1,R2 ;R2 DECREMENT BY 2
667 003304 001401          BEQ ,+4
668 003306 000000          HLT
669
670 ;TEST THAT MTP D/I CAN LOAD MEMORY ADDRESSES,
671 ;KERNEL MODE
672 003310 010701          T41: SCOPE
673 003312 005037 177776 CLR ##PSW
674 003316 012700 177777 MOV #-1,R0
675 003322 012737 003356 000004 MOV #T41A,##ERRVEC
676 003330 005067 174452 CLR ERRVEC+2
677 003334 052737 000000 177776 BIS #REG,##PSW ;R0-R5
678 003342 005000          CLR R0
679 003344 012746 000002 MOV #2,-(KSP)
680 003350 000261          SEC
681 003352 006620          MTPI (R0)+ ;(R0)+_(KSP)+
682 003354 000401          BR ,+4
683 003356 000000          HLT ;ERROR! TRAPPED
684 003360 103401          BCS ,+4 ;MTP D/I SHOULD NOT AFFECT CARRY
685 003362 000000          HLT ;BIT ERROR! CARRY BIT BUT CLEARED.
686 003364 022767 000002 174406 CMP #2,0
687 003372 001401          BEQ ,+4
688 003374 000000          HLT

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689
690 003376 010701
691 003400 012737 003426 000004 T41B1 SCOPE
692 003406 012706 000500 MOV #T41BB, #ERRVEC ;LOAD ERROR VECTOR
693 003412 012716 177777 MOV #KPTR, KSP ;SET KERNEL STACK POINTER
694 003416 000257 MOV #-1, (KSP) ;LOAD KERNEL STACK
695 003420 006637 001002 CCC ;PRESET CC'S
MTP1 #TEMP ;#TEMP_(KSP)+
696
697 003424 000401
698 003426 000000
699 003430 013700 177776 T41BB: BR .+4
700 003434 022700 000010 HLT ;ERROR! TRAPPED
MOV #PSW, R0 ;SAVE CC'S
701 003440 001401 CMP #REG+N, R0 ;CHECK RESULT STATUS
BEQ .+4
702 003442 000000 HLT ;ERROR! INCORRECT STATUS AFTER MTPD
703 003444 005237 001002 INC #TEMP ;CHECK RESULT
704 003450 001401 BEQ .+4
705 003452 000000 HLT ;ERROR! MTPD FAILED
706
707
708 003454 010701 ;USER MODE
T43: SCOPE
709 003456 005037 177776 CLR #PSW
710 003462 012703 177777 MOV #-1, R3
711 003466 012737 003526 000004 MOV #T43A, #ERRVEC
712 003474 012737 140000 177776 MOV #UM, #PSW
713 003502 012703 001004 MOV #TEMP+2, R3
714 003506 005067 175270 CLR TEMP
715 003512 012706 000700 MOV #UPTR, USP
716 003516 052716 177777 BIS #-1, (USP)
717 003522 006643 MTP1 n(R3) ;I=(R3)_(USP)+
BR .+4
718 003524 000401
719 003526 000000 T43A: HLT ;ERROR TRAPPED
720 003530 013700 177776 MOV #PSW, R0
721 003534 042737 140000 177776 BIC #UM, #PSW ;KERNEL MODE!!!
722 003542 122700 000010 CMPB #N, R0
723 003546 001401 BEQ .+4
724 003550 000000 HLT
725 003552 005167 175224 COM TEMP
726 003556 001401 BEQ .+4
727 003560 000000 HLT
728 003562 012737 000006 000004 MOV #ERRVEC+2, #ERRVEC
729 003570 005067 174212 CLR ERRVEC+2
730
731 ;TEST THAT MFP D/I PUSHES DESTINATION REGISTER DATA ONTO THE APPROPRIATE STACK
732 ; (AS DETERMINED BY #PSW BITS 15 & 14)
733 ; KERNEL MODE, MFPD
T44: SCOPE
734 003574 010701
735 003576 012706 000500 MOV #KPTR, KSP
736 003602 012716 125252 MOV #125252, (KSP)
737 003606 012700 177777 MOV #-1, R0
738 003612 000261 SEC
739 003614 006500 MFP1 R0 ;I=(KSP)_R0, (R0)=-1
740 003616 013702 177776 MOV #PSW, R2 ;GET STATUS RESULT
741 003622 022702 000011 CMP #REG+N+C, R2 ;
742 003626 001401 BEQ .+4

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743 003630 000000
744 003632 022706 000476 HLT ;ERROR! INCORRECT STATUS RESULT
745 003636 001401 CMP #KPTR-2, KSP ;DID KERNEL STACK POINTER GET
746 003640 000000 BEQ .+4 ;PUSHED?
747 003642 005116 HLT ;ERROR!
748 003644 001401 COM (KSP) ;TEST THAT CORRECT DATA(-1) GOT
749 003646 000000 BEQ .+4 ;PUSHED ONTO KERNEL STACK
750 HLT ;ERROR! -1 NOT PUSHED ONTO KERNEL STACK
;KERNEL MODE, MFP1
T45: SCOPE
751 003650 010701
752 003652 012706 000500 MOV #KPTR, KSP
753 003656 012716 052525 MOV #52525, (KSP) ;PRE SET STACK
754 003662 005004 CLR R4 ;PRESET 'WRONG' REGISTER
755 003664 012737 000001 177776 MOV #REG+C, #PSW ;SELECT R0-R5, SET C
756 003672 012704 125252 MOV #125252, R4 ;LOAD DATA TO BE MOVED
757 003676 006504 MFP1 R4 ;I=(KSP)_R4, (R4)=125252
758
759 003700 013700 177776 MOV #PSW, R0
760 003704 022700 000011 CMP #REG+N+C, R0 ;CHECK STATUS RESULT
761 003710 001401 BEQ .+4
762 003712 000000 HLT ;ERROR! INCORRECT STATUS
763 003714 022706 000476 CMP #KPTR-2, KSP ;CHECK PUSH
764 003720 001401 BEQ .+4
765 003722 000000 HLT ;ERROR! KSP DID NOT PUSH DOWN
766 003724 022716 125252 CMP #125252, (KSP) ;CHECK DATA ON THE STACK
767 003730 001401 BEQ .+4
768 003732 000000 HLT ;ERROR! INCORRECT DATA ON THE STACK
769 ;IF DATA=0 THEN INCORRECT REGISTER
770 ; (R4), IF DATA=52525 NO DATA PUSHED
771 ; ON THE STACK.
;USER MODE, MFPD
T50: SCOPE
772
773 003734 010701
774 003736 005003 CLR R3 ;PRESET
775 003740 012737 140000 177776 MOV #UM, #PSW ;USER MODE, R0-R5
776 003746 012706 000700 MOV #UPTR, USP ;SET USER'S STACK POINTER
777 003752 012726 125252 MOV #125252, (USP)+ ;PRESET STACK
778 003756 012703 177777 MOV #-1, R3 ;
779 003762 000257 CCC
780 003764 006503 MFP1 R3 ;I=(USP)_R3 (R3)=-1
781
782 003766 013700 177776 MOV #PSW, R0
783 003772 010604 MOV USP, R4
784 003774 042737 140000 177776 BIC #UM, #PSW
785 004002 022700 140010 CMP #UM+N, R0
786 004006 001401 BEQ .+4
787 004010 000000 HLT
788 004012 022704 000700 CMP #UPTR, R4
789 004016 001401 BEQ .+4
790 004020 000000 HLT
791 004022 005214 INC (R4)
792 004024 001401 BEQ .+4
793 004026 000000 HLT
794 004030 005037 177776 CLR #PSW
;USER MODE, MFP1
T51: SCOPE
795
796 004034 010701

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905 004514 012737 030000 177776      MOV      #KM+PUM,#PSW      ;KERNEL MODE!!!, PREV USER MODE!!
906 004522 012706 000500                MOV      #KPTR,KSP        ;SET KERNEL STACK POINTER
907 004526 012716 177777                MOV      #-1,(KSP)
908 004532 006606                MTP1    USP              ;SET USER STACK POINTER USP_(KSP)+
909 004534 005166 177776                COM      -2(KSP)          ;PRESET KERNEL STACK
910 004540 000500                MFPI    USP              ;-(KSP)_USP
911 004542 022716 177777                CMP      #-1,(KSP)       ;CHECK THAT USER STACK POINTER WAS
912 004546 001401                BEQ     .+4              ;PUSHED ONTO KERNEL STACK
913 004550 000000                HLT                     ;ERROR!
914
915
916 004552 010701                ;-(USP)_USP,MFPD
T65: SCOPE
917 004554 012737 030000 177776      MOV      #PUM,#PSW      ;KERNEL MODE!!!, PREV USER MODE!!
918 004562 012706 000500                MOV      #KPTR,KSP        ;SET KERNEL STACK POINTER
919 004566 012716 000700                MOV      #UPTR,(KSP)
920 004572 006606                MTP1    USP              ;SET USER STACK POINTER
921 004574 005067 174076                CLR      UPTR=2
922 004600 052737 140000 177776      BIS      #UM,#PSW      ;USER MODE!!!, PREV USER MODE!!!
923 004606 006506                MFPI    USP              ;PUSH USER STACK POINTER ONTO USER STACK
924 004610 042737 140000 177776      BIC      #UM,#PSW      ;KERNEL MODE!!!, PREV USER MODE!!
925 004616 006506                MFPI    USP              ;PUSH USER STACK POINTER ONTO KERNEL STACK
926 004620 022716 000676                CMP      #UPTR-2,(KSP)   ;CHECK THAT USER STACK POINTER WAS
927 004624 001401                BEQ     .+4              ;PUSHED PROPERLY (ONCE)
928 004626 000000                HLT                     ;ERROR!
929 004630 022767 000700 174040      CMP      #UPTR,UPTR-2   ;CHECK THAT USER STACK POINTER IS ON THE
930 004636 001401                BEQ     .+4              ;USERS STACK
931 004640 000000                HLT                     ;ERROR!
932
933
934 004642 010701                ;-(KSP)_KSP,MFPI
T66: SCOPE
935 004644 005037 177776                CLR      #PSW           ;KERNEL MODE!!!, PREV KERNEL MODE!!
936 004650 012706 000500                MOV      #KPTR,KSP        ;SET KERNEL STACK POINTER
937 004654 006506                MFPI    KSP             ;PUSH KERNEL STACK POINTER ONTO KERNEL
938                                ;STACK
939 004656 022767 000500 173612      CMP      #KPTR,KPTR-2   ;CHECK RESULT
940 004664 001401                BEQ     .+4
941 004666 000000                HLT                     ;ERROR!
942
943
944 004670 010701                ;-(KSP)_USP,MFPI
T70: SCOPE
945 004672 012737 030000 177776      MOV      #PUM,#PSW      ;KERNEL MODE!!!, PREV USER MODE!!
946 004700 012706 000500                MOV      #KPTR,KSP        ;SET KERNEL STACK POINTER
947 004704 012716 177777                MOV      #-1,(KSP)
948 004710 006606                MTP1    USP              ;SET USER STACK POINTER
949 004712 005166 177776                COM      -2(KSP)          ;PRESET KERNEL STACK
950 004716 006506                MFPI    USP              ;PUSH USER STACK POINTER ONTO KERNEL STACK
951 004720 022716 177777                CMP      #-1,(KSP)       ;CHECK RESULT
952 004724 001401                BEQ     .+4
953 004726 000000                HLT                     ;ERROR! USER STACK POINTER NOT ON KERNEL STACK
954
955
956 004730 010701                ;-(USP)_USP,MFPI
T73: SCOPE
957 004732 012737 030000 177776      MOV      #PUM,#PSW      ;KERNEL MODE!!!, PREV USER MODE!!
958 004740 012706 000500                MOV      #KPTR,KSP        ;SET KERNEL STACK POINTER

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959 004744 012716 000700                MOV      #UPTR,(KSP)
960 004750 006606                MTP1    USP              ;SET USER STACK POINTER
961 004752 005067 173720                CLR      UPTR=2
962 004756 052737 140000 177776      BIS      #UM,#PSW      ;USER MODE!!!, PREV USER MODE!!
963 004764 006506                MFPI    USP              ;-(USP)_USP
964 004766 042737 140000 177776      BIC      #UM,#PSW      ;KERNEL MODE!!!
965 004774 006506                MFPI    USP              ;GET USER STACK POINTER
966 004776 022716 000676                CMP      #UPTR-2,(KSP)   ;CHECK THAT USER STACK POINTER WAS
967 005002 001401                BEQ     .+4              ;PUSHED ONCE
968 005004 000000                HLT                     ;ERROR!
969 005006 022767 000700 173662      CMP      #UPTR,UPTR-2   ;CHECK THAT USER STACK POINTER WAS PUSHED
970 005014 001401                BEQ     .+4              ;ONTO USER STACK
971 005016 000000                HLT                     ;ERROR!
972
973
974 005020 010701                ;TEST THAT ILLEGAL MODE DOES NOT HANG BUS.
T74: SCOPE
975 005022 012737 100000 177776      MOV      #IM,#PSW      ;ILLEGAL MODE!!!
976 005030 013700 177776                MOV      #PSW,R0        ;GET ILLEGAL MODE
977 005034 005037 177776                CLR      #PSW           ;KERNEL MODE!!
978 005040 022700 100000                CMP      #IM,R0         ;CHECK THAT ILLEGAL MODE WAS SET
979 005044 001401                BEQ     .+4              ;INTO STATUS
980 005046 000000                HLT
981
982
983 005050 010701                ;TEST THAT ILLEGAL MODE DOES NOT HANG BUS.
T75: SCOPE
984 005052 012737 040000 177776      MOV      #IH1,#PSW      ;ILLEGAL MODE!!!
985 005060 013700 177776                MOV      #PSW,R0        ;GET ILLEGAL MODE
986 005064 005037 177776                CLR      #PSW           ;KERNEL MODE!!
987 005070 022700 040000                CMP      #IH1,R0       ;CHECK THAT ILLEGAL MODE WAS SET
988 005074 001401                BEQ     .+4              ;INTO STATUS
989 005076 000000                HLT
990
991
992 005100 010701                ;TEST THAT KERNEL CAN GET DATA FROM USER STACK
T76: SCOPE
993 005102 012737 030000 177776      MOV      #KM+PUM,#PSW   ;KERNEL MODE!!!, PREV USER MODE!!
994 005110 012706 000500                MOV      #KPTR,KSP        ;SET KERNEL STACK POINTER
995 005114 012716 000700                MOV      #UPTR,(KSP)
996 005120 006606                MTP1    USP              ;SET USER STACK POINTER
997 005122 005067 173552                CLR      UPTR            ;PRESET USER STACK
998 005126 005016                CLR      (KSP)          ;PRESET KERNEL STACK
999 005130 012766 177777 177776      MOV      #-1,-2(KSP)
1000 005136 006506                MFPI    USP              ;-(KSP)_USP
1001 005140 006576 000000                MFPI    @(KSP)         ;LIKE MOV #(6),-(6)
1002 005144 000240                NOP
1003 005146 013703 177776                MOV      #PSW,R3        ;SAVE STATUS RESULT
1004 005152 022767 000700 173320      CMP      #UPTR,KPTR     ;CHECK THAT USER STACK POINTER WAS
1005 005160 001401                BEQ     .+4              ;PUSHED ONTO KERNEL STACK
1006 005162 000000                HLT                     ;ERROR!
1007 005164 022706 000476                CMP      #KPTR-2,KSP    ;CHECK THAT KERNEL STACK POINTER IS POS-
1008 005170 001401                BEQ     .+4              ;ITIONED PROPERLY
1009 005172 000000                HLT                     ;ERROR! INCORRECT KERNEL STACK POINTER
1010 005174 005716                TST     (KSP)          ;CHECK THAT CORRECT DATA
1011 005176 001401                BEQ     .+4              ;WAS PUSHED ONTO KERNEL STACK
1012 005200 000000                HLT                     ;ERROR!

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1121 005666 010701          T111: SCOPE
1122 005670 012737 140000 177776 MOV #UM,#PSW ;USER MODE!!!
1123 005676 012706 000700 MOV #UPTR,USP ;SET USER STACK PTR
1124 005702 012737 005730 000004 MOV #T111A,#ERRVEC ILOAD ERROR TRAP VECTOR
1125 005710 012737 140000 000006 MOV #UM,#ERRVEC+2
1126 005716 006567 172055 MFPI #-1 ;ODD ADDRESS SHOULD TRAP
1127 005722 005037 177776 T111AA: CLR #PSW ;KERNEL MODE!!!
1128 005726 000000 HLT ;ERROR! FAILED TO TRAP
1129 005730 010603 T111A: MOV USP,R3 ;SAVE USER STACK PTR
1130 005732 042737 140000 177776 BIC #UM,#PSW ;KERNEL MODE!!!
1131 005740 022703 000674 CMP #UPTR-4,R3 ;CHECK USER STACK PTR
1132 005744 001401 BEQ ,+4
1133 005746 000000 HLT ;ERROR! INCORRECT USER STACK POINTER
1134 005750 022713 005722 CMP #T111AA,(R3) ;CHECK RETURN ADDRESS ON USER STACK
1135 005754 001401 BEQ ,+4
1136 005756 000000 HLT ;ERROR! RETURN PC NOT ON USER STACK
1137 005760 012737 000006 000004 MOV #ERRVEC+2,#ERRVEC;RESTORE ERROR TRAP TO HALT
1138 005766 005067 172014 CLR ERRVEC+2
1139
1140 ;TEST THAT MTPD INSTRUCTION CAN LOAD DATA TO AN ADDRESS VIA THE STACK
1141 ;KERNEL MODE,PREVIOUS USER MODE
1142 005772 010701          T112: SCOPE
1143 005774 012737 030000 177776 MOV #KM+PUM,#PSW ;KERNEL MODE!!!, PREV USER MODE!!
1144 006002 012706 000500 MOV #KPTR,KSP ;SET KERNEL STACK PTR
1145 006006 012746 000700 MOV #UPTR,-(KSP)
1146 006012 006606 MTPI USP ;SET USER STACK PTR
1147 006014 012746 001002 MOV #TEMP,-(KSP) ;PUT ADDRESS ON THE STACK
1148 006020 012746 177777 MOV #-1,-(KSP) ;PUT DATA ON THE STAK
1149 006024 005037 001002 CLR #TEMP ;PRESET DATA
1150 006030 006636 MTPI #(KSP)+ ;MOVE #-1 TO TEMP
1151 006032 022706 000500 CMP #KPTR,KSP ;CHECK STACK PTR AFTER MTPD
1152 006036 001401 BEQ ,+4
1153 006040 000000 HLT ;ERROR! INCORRECT STACK PTR AFTER MTPD
1154 006042 005267 172734 INC TEMP ;CHECK THAT DATA WAS MOVED TO TEMP
1155 006046 001401 BEQ ,+4
1156 006050 000000 HLT ;ERROR! DATA NOT IN TEMP
1157 006052 006506 MFPI USP ;GET USER STACK PTR
1158 006054 022716 000700 CMP #UPTR,(KSP) ;CHECK THAT USER STACK PTR NOT CHANGED
1159 006060 001401 BEQ ,+4 ;BY MTPD INSTRUCTION
1160 006062 000000 HLT ;ERROR! USP WAS CHANGED BY MTPD INST.
1161
1162 006064 005267 172710 END: INC ICNT ;INCREMENT PASS COUNT
1163 006070 026727 172704 000144 CMP ICNT,#100. ;100 PASSES COMPLETED?
1164 006076 001402 BEQ DONE
1165 006100 000167 172726 JMP BEGIN
1166 006104 012767 000007 171454 DONE: MOV #7,TPB ;RING BELL
1167 006112 105767 171446 TSTB TPS
1168 006116 100375 BPL ,+4
1169 006120 012767 000177 171440 MOV #177,TPB
1170 006126 105767 171432 TSTB TPS
1171 006132 100375 BPL ,+4
1172 006134 013701 000042 LOGICT: MOV #42,X1 ;RETURN TO MONITOR?
1173 006140 001405 BEQ LOGICE
1174 006142 000005 RESET
    
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1175 006144 004711          LOGICT: JSR 7,(1) ;RETURN!
1176 006146 000240 NOP
1177 006150 000240 NOP
1178 006152 000240 NOP
1179 006154 000167 172632 LOGICE: JMP START
1180 006156 000001 .END
    
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BEGIN	001032	BIT13	= 020000	BIT14	= 000000	BIT15	= 100000
BIT6	= 000100	C	= 000001	DONE	= 006104	EMTVEC	= 000030
END	006064	ERRVEC	= 000004	HLT	= 000000	ICNT	= 001000
IM	= 100000	IM1	= 040000	IOIVEC	= 000020	KM	= 000000
KPTR	= 000500	K&P	= X000006	LOGIC	006144	LOGICE	006154
LOGICY	006134	N	= 000010	PC	= X000007	PKM	= 000000
PRTY3	= 000140	PRTY4	= 000200	PRTY7	= 000340	PSW	= 177776
PUM	= 030000	PWRUP	001022	REDPTR	= 000736	REG	= 000000
RESVEC	= 000010	R0	= X000000	R1	= X000001	R2	= X000002
R3	= X000003	R4	= X000004	R5	= X000005	SCOPE	= 010701
SP	= X000006	START	001012	SWR	= 177570	TBIT	= 000020
TBITVE	= 000014	TEMP	001002	TKB	= 177562	TKS	= 177560
TPB	= 177566	TPS	= 177564	TPVEC	= 000064	TRAPVE	= 000034
TRT	= 000003	TRTVEC	= 000014	T1	001036	T102	005212
T103	005276	T104	005374	T104A	005422	T106	005432
T106A	005464	T107	005504	T107A	005534	T107AA	005532
T110	005564	T110A	005626	T110AA	005620	T111	005666
T111A	005730	T111AA	005722	T112	005772	T12	001352
T12A	001410	T12AA	001402	T13	001442	T13A	001474
T13AA	001466	T15	001640	T15A	001720	T15AA	001710
T17	002002	T17A	002030	T170	002042	T17C	002062
T17D	002112	T17E	002134	T17ERR	002234	T17F	002154
T17G	002206	T17X	002242	T18	001534	T19	001576
T21	002256	T22	002340	T25	002422	T26	002512
T30	002602	T31	002676	T31C	002722	T32A	002774
T35	003044	T36	003104	T36A	003142	T36AA	003140
T40	003164	T40A	003234	T40AA	003226	T41	003310
T41A	003356	T41B	003376	T410B	003426	T43	003454
T43A	003526	T44	003574	T45	003650	T5	001070
T5A	001134	T5AA	001126	T50	003734	T51	004034
T52	004132	T54	004234	T57	004352	T57A	004456
T57AA	004406	T57EX	004462	T60	004464	T62	004512
T65	004552	T66	004642	T7	001242	T7A	001302
T7AA	001274	T70	004670	T73	004730	T74	005020
T75	005050	T76	005100	UM	= 140000	UPTR	= 000700
USP	= X000006	V	= 000002	YELPTR	= 001000	Z	= 000004
.	= 006160						

ERRORS DETECTED: 0

*DFKTD,DFKTD=DFKTD, SRC/SOL
RUN=TIME: 3 6 0 SECONDS
CORE USED: 5K